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Characterization of epiphytic ferns *Asplenium indicum* By GC-MS From Panchgani and Mahabaleshwar area of Maharashtra

Damayanti Choudhari, Manda Ghatage

Department of Botany Kisan Veer Mahavidyalay Wai

Department of Botany, B V's M.B. S. K., Kanya Mahavidhyalaya, Kadegoan, Sangali, India.

E-Mail: jadhavdamayanti@gmail.com

mandaghatge75@gmail.com

Abstract : The GCMS analysis of methanolic extracts of *Asplenium indicum* leaves revealed the presence of some compounds. The compound includes Ethanol, 1-(2-butoxyethoxy)-, 3-Allyl-6-methoxyphenol, Ethanol, 2-(2-butoxyethoxy)-acetate, Neophytadiene, Hexanedioic acid, bis (2-ethylhexyl) ester, Hexadecanoic acid, 2-hydroxyl-1-(hydroxymethyl) ethyl ester. Ethanol, 2-(2-butoxyethoxy)-acetate. From the results concluded that the epiphytic fern *Asplenium indicum* leaves contain various bioactive compounds which have various medicinal properties.

Keywords: *Asplenium indicum*, epiphytic, 3-Allyl-6-methoxyphenol, bioactive.

Introduction:

Pteridophytes are vascular cryptogams epiphytic, shade loving from the dominant vegetation on the earth (Fraser Jenkins 2008). These plant groups have an important role in ecosystem and had various ethnomedicinal uses which had to be investigated in detail. Unfortunately pteridophytes are ignored groups of plants and had significant medicinal properties which are traditionally used by ethnic communities (Annie and Kumaresan 2010, Vashishta *et al.*, 2012). *Asplenium indicum* is an epiphytic pteridophyte found in the hilly region of the Western Ghats of India. In recent years Gas chromatography – Mass spectroscopy has been applied as a technique to identify the structures of different bioactive components from plant extracts with great success (Prasain 2004, De Rijke 2006). Hence in the present investigation was carried out to determine the possible bioactive compounds of *Asplenium indicum* by GC-MS studies.

Methods:

GC-MS analysis was conducted to identify the chemical composition of the one epiphytic fern species under study. Analysis was carried out on a GC Clarus 500 Perkin Elmer system comprising an AOC-20i auto sampler and gas chromatograph interfaced to a mass

spectrometer. Column Elite -1 fused silica capillary column operating in electron impact mode at 70 eV. For analysis Helium was used as carrier gas. [Continuous flow of 1ml/min.]. 2µl extract prepared in methanol was injected to the instrument Turbo goldmass detector and turbomass 5.1 software detected the sample during 36 min of the extraction process. Oven was kept at 110°C with 2 min holding temperature of injector was kept at 250°C. Other important parameters include- 1. Mass spectra were taken at 17EV, 2. A scan interval of 0.5 S 3. Fragmented from 45 to 450 Da the MS detection was completed in 38 min. By comparing average peak area of component with the total area, relative percentage of amount of each component was calculated. Biological activities of the known components of the spectrum were determined by using literature.

Result:

GC-MS analysis of *Asplenium indicum* accommodate the occurrence of various bioactive phytoconstituents in the methanolic extracts. The bioactive principles with their RT, molecular formula, molecular weight and concentration (%), biological activity in the methanolic extracts of *Asplenium indicum* was presented in the (Fig. and Table1).

Fig 1. GC-MS analysis of *Asplenium indicum*

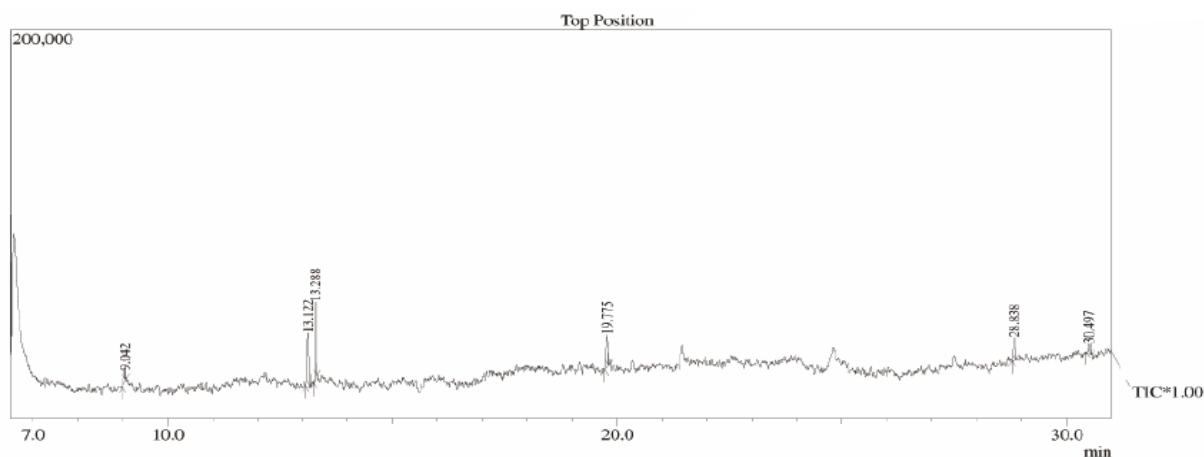


Table 1. GCMS peak report of *Asplenium indicum*.

Name of the compound	R.T	Peak Area	Molecular Formula	Molecular Weight	Biological Activity

Ethanol,1-(2-butoxyethoxy)-	9.04 2	123 67	$C_8H_{18}O_3$	162	-
3-Allyl-6-methoxyphenol	13.1 22	611 33	$C_{10}H_{12}O_2$	164	Antihistaminic, anti-inflammatory and Antioxidant activity (Hussein 2016) antiseptic and anesthetic, analgesic, antioxidant, anti-inflammatory and antimicrobial activities(Jadhav 2004)
Ethanol,2-(2-butoxyethoxy)-acetate	13.2 88	761 44	$C_{10}H_{20}O_4$	204	paints, adhesives, plastics, and paint remover(Yang 2020)
Neophytadiene	19.7 75	375 57	$C_{20}H_{38}$	278	Antipyretic , analgesic acid, anti-inflammatory, antioxidant, antimicrobial.(Adnan 2019), (Raman 2012)
Hexanedioic acid, bis(2-ethylhexyl)ester	28.8 38	290 71	$C_{22}H_{42}O_4$	370	Antioxidant, antimicrobial, ant proliferative (Nguyen2018). Acidifier, acidulant, antiuric acid production (Arora 2018) (Dr.Duke's Phytochemical and Ethno botanical Database)
Hexanedioic acid,2-hydroxy-1hydroxymethyl)ethyl ester	30.4 97	118 35	$C_{19}H_{38}O_4$	330	Hemolytic, pesticide, flavor, antioxidant (Arora and Kumar 2018)

Discussion and conclusion:

Karthishwaran *et al.*, (2012) Concluded that GCMS are important technique for separation of compounds. These compounds showed pharmacological properties. Bertz *et al.*, (1997) reported that GCMS has many applications including it is the best technique for identification and separation of volatile and semi-volatile compounds. Previous studies on GC-MS analysis showed the occurrence of various compounds in *Adiantum tetraphyllum* (Melos *et al.*, 2007), *Salvinia molesta* (Choudhary *et al.*, 2008), *Marsilea quadrifolia*

(Sivagurunathan and Xavier, 2014) and *Actiniopteris radiata* (Manonmani and Sara, 2015). The present study showed various bioactive compounds with pharmacological properties.

Janakiraman (2015) observed major bioactive components 2methylbutance,4-diol, 3-(1-ethoxyethoxy)-, 2-hydroxy-5-methylbenzaldehyde, 3-5 dinydroxy-4-methylbenzaldehyde. *Dryanaria quercifolia* revealed the presence of major compounds namely Tetrahydro isovelleral 7, 10, Pentadeadi-Yanoic acid, Phosphoric acid, Octyldiphenyl Ester, Octicizer Phosphoric acid, 2ethylhexyl Diphenyl Ester, Quercetin 7, 3, 4 trimethox, 30triacotanediol Ergost-s-en3-0l. Compounds are reported s by (Kalpna Devi R 2016).

The results of GC-MS analysis showed the presence of different phytoconstituents in the studied *Asplenium indicum* species with varied retention time. The identified phytochemicals from the fern under study showed anti-inflammatory, anti-uric acid, anti-oxidant, anti-bacterial, hepatoprotectant, antifungal, Antihistaminic, antiseptic and anesthetic, analgesic, antipyrepic, analgesic acid, hemolytic, pesticide, , Further phytochemical and pharmacological analysis of the epiphytic fern *Asplenium indicum* under study may use as natural drugs developments.

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